ABSTRACT

Purpose: To study HIV-associated risk behaviours among young offenders.
Methods: Juveniles aged 12 to 19 years entering correctional facilities in British Columbia volunteered in an unlinked anonymous study. Logistic regression was used to identify factors associated with high-risk sexual behaviours and injection drug use (IDU).
Results: Despite low HIV prevalence (0.25%), patterns of risk behaviour were evident. IDU and homosexual/bisexual activity were equally prevalent among youth aged 12 to 15 and 16 to 19 years. For both age groups, IDU and female gender were significant predictors of sex for trade and sex with another drug user. Natives aged 12 to 15 years were five times more likely to inject drugs than non-Natives. However, predictors of IDU differed for older vs. younger youth.
Conclusions: Patterns of high-risk activity begin early and selective pressures may differ for younger vs. older young offenders. Youth in detention provide a window of opportunity for enhanced HIV/AIDS education.

ABRÉGÉ

But : Étudier la prévalence de l'infection au VIH et les comportements à haut risque chez les jeunes admis dans des centres de détention.
Méthodologie : Les jeunes âgés de 12 à 19 ans admis dans six centres de détention en Colombie Britannique ont accepté de participer à une étude anonyme, non reliée. Nous avons utilisé un modèle de régression logistique afin d'identifier les facteurs associés aux comportements sexuels à haut risque et à l'usage de drogues injectables.
Résultats : Malgré une faible prévalence de l'infection au VIH (0,25 %), la présence de comportements à haut risque était évidente. L'usage de drogue injectable et les activités sexuelles entre hommes étaient aussi prévalents chez les jeunes de 12 à 15 ans que chez ceux de 16 à 19 ans. Chez les deux groupes d'âge, l'usage de drogue injectable et le sexe féminin sont apparus comme des prédicteurs significatifs des activités sexuelles pour de l'argent et du fait d'avoir des relations sexuelles avec un autre usager de drogue injectable. Le risque d'injection de drogue chez les jeunes autochtones âgés de 12 à 15 ans était cinq fois plus important que chez les non-autochtones. Cependant, les facteurs associés à l'usage de drogue injectable étaient différents chez les plus âgés comparativement aux plus jeunes.
Conclusions : Les comportements à haut risque se manifestent tôt dans la vie et des forces différentes semblent s'exercer selon l'âge. Les jeunes en détention représentent un groupe privilégié pour des interventions intensives d'éducation sur le VIH/sida.

Determinants of HIV-related High Risk Behaviours Among Young Offenders: A Window of Opportunity

Diane A. Rothon, MD,[1] Steffanie A. Strathdee, PhD,[2,3] Darrel Cook, MSc, RSM(CCM),[4] Peter G.A. Cornelisse, BA, MSc[2]

Young offenders entering the correctional system provide health care personnel with an ideal opportunity to evaluate and assist adolescents who may be at high risk of HIV infection. Street-involved youth are over-represented in detention centres[1] and are often arrested for activities directly or indirectly related to injection drug use (IDU) or prostitution.[2] Compared to other adolescents, youth in detention have higher rates of sexually transmitted diseases (STDs),[3,4] lower rates of condom use[2,5] and a lower perceived risk of HIV infection.[6]

There is a surprising lack of data on HIV infection rates and associated risk behaviours among young offenders. A systematic analysis of demographic characteristics and risk behaviours for HIV infection is needed to develop prevention strategies, and will provide a first step towards risk behaviour surveillance of high-risk adolescent populations. Herein, we report upon determinants of specific sexual and drug-using behaviours which were identified in a study of HIV prevalence among young offenders in British Columbia.

METHODS

From January to April 1994, all young offenders aged 12 to 19 years, who were newly admitted to one of six points of direct entry into the juvenile correctional system in British Columbia, were invited to participate in this study. Subjects were only included once, even if readmission occurred. The protocol had been approved by the Corrections Branch of the Ministry of the Attorney General of British Columbia and the British Columbia Civil Liberties Association. A previous study using the same protocol had been approved by the Ministry's Legal Services Branch and two inmate committees.[7]

According to standard procedures in the province of British Columbia, voluntary confidential serum HIV antibody testing with pre- and post-test counselling is offered to all new inmates/young offenders. For study purposes, voluntary HIV antibody testing was conducted using saliva (OMNI-SAL Saliva Collection Device, Saliva Diagnostic Systems, PTE Ltd, Singapore), which has been shown to be a convenient, feasible and generally acceptable means of conducting HIV prevalence studies in the correctional setting.[7] HIV testing was conducted at the B.C. Ministry of Health's Provincial Laboratory using enzyme immunoassay (Recombigen HIV-1 EIA kit, Cambridge Biotech, Cambridge, Mass), which has a sensitivity and specificity of 98.3% and 100%, respectively.[8] All reactive specimens were confirmed by radioimmunoprecipitation.

All young offenders, including those who refused HIV testing, underwent a standard physical examination. Corrections nurses conducted a short, one-on-one interview including demographic data, medical history and risk factors for HIV infection. The number of questions was limited to maximize compliance and minimize time and labour. Demographic data

1. Health Services, Corrections Branch, Ministry of the Attorney General of British Columbia
2. British Columbia Centre for Excellence in HIV/AIDS, St. Paul's Hospital and University of British Columbia
3. Department of Health Care and Epidemiology, Faculty of Medicine, University of British Columbia
4. Provincial Laboratory, British Columbia Centre for Disease Control, British Columbia Ministry of Health

Correspondence: Dr. Diane A. Rothon, Director, Health Services, Corrections Branch, #185 - 911 Yates Street, Victoria, BC V8V 4Y9

included age group (12 to 15 or 16 to 19 years old), gender, intake centre (urban vs. rural), and ethnic origin (Native vs. non-Native). Respondents were asked whether they had ever engaged in IDU or sex with an injection drug user, if they had ever had sex with someone of the same gender, if they had ever exchanged sex for money, goods, drugs or shelter (denoted sex for trade), and if they had previously tested HIV-positive.

Statistical analysis involved chi-square or Fisher's exact test to compare proportions. Stepwise logistic regression was used to identify predictors of high-risk behaviours such as IDU, sex for trade and sex with injection drug users. IDU was treated as a dependent variable, and as an independent variable when predictors of sexual behaviours were examined. The small number of youth who reported sex with a member of the same gender precluded a meaningful regression analysis. Models were developed for both age groups combined and separately. For each set of models, the appropriateness of using a common odds ratio for combined strata was evaluated using the Mantel test for homogeneity.[9]

TABLE I
Behavioural Characteristics of a Sample of Young Offenders Aged 12 to 19 Years Participating in a Voluntary Study of HIV Prevalence and Risk Behaviours in British Columbia, Canada

Characteristic	Ages 12-19 Number (%)	Age (12-15) (N=354) Total (n)	% of Total	Age (16-19) (N=452) Total (n)	% of Total
Injection Drug Use	37 (4.6)	16	4.5	21	4.7
Males	23 (3.4)	11	3.9	12	3.1
Females	14 (10.2)	5	6.7	9	14.5
Same Gender Sex	15 (1.9)	6	1.7	9	2.0
Males	7 (1.1)	4	1.4	3	0.8
Females	8 (5.8)	2	2.7	6	9.7
Sex for Trade	54 (6.7)	18	5.1	36	8.0
Males	25 (3.7)	8	2.9	17	4.4
Females	29 (21.2)	10	13.3	19	30.6
Sex with Injection Drug Users	53 (6.6)	20	5.7	33	7.3
Males	27 (4.0)	11	3.9	16	4.1
Females	26 (19.0)	9	12.0	17	27.4

TABLE II
Results of Univariate Logistic Regression Analysis of Behaviours in a Sample of Young Offenders Aged 12 to 15 Years Participating in a Voluntary Study of HIV Prevalence and Risk Behaviours in British Columbia, Canada

Variable	Coefficient	OR	95% CI	p-value
IDU				
Gender (female vs. male)	0.32	1.38	(0.43, 4.47)	p=0.58
Ethnicity (Native vs. non-Native)	1.65	5.22	(1.80,15.13)	p<0.001
Sex for Trade				
Gender (female vs. male)	1.54	4.66	(1.73, 12.53)	p< 0.001
IDU	1.75	5.75	(1.46,22.71)	p=0.013
Sex with IDU				
Gender (female vs. male)	1.08	2.93	(1.13, 7.58)	p=0.026
IDU	2.44	11.50	(3.46,38.16)	p<0.001

RESULTS

A total of 806 young offenders, 669 males and 137 females, were admitted during the study period. The majority were male (83%), non-Native (75%) and between the ages of 16 to 19 years (56%). There were no differences between the study sample and a census population conducted over the same three-month period with respect to gender (p=0.25) or age group (p=0.87); however, there was a higher proportion of Natives in the study sample (25.5% vs. 18%; p<0.001). Only 2.2% (18/806) refused HIV testing, and one subject provided an insufficient saliva sample. There were no significant differences between those who participated or refused in terms of gender, age group, ethnicity, or history of IDU (p>0.1).

Only 2 of 787 specimens were confirmed HIV-antibody positive, for an overall rate of 0.25% (95% confidence interval 0.040 - 1.019). Both reactive samples were from non-Native males in each age group. Both were unaware of their HIV status and denied HIV-associated risk behaviours. Interestingly, two different respondents, both Native females, claimed to know that they were HIV-positive but actually tested HIV-antibody negative.

Table I reports frequencies of specific high-risk behaviours for subjects aged 12 to 15 and 16 to 19 years. A greater proportion of females than males reported IDU (10.2% vs. 3.4%, respectively; p<0.001), and sex with an injection drug user (19% vs. 4%; p<0.001). Females were also more likely than males to report a history of sex for trade (21.2% vs. 3.8%, respectively). Youth aged 16 to 19 years were almost twice as likely to have engaged in sex for trade as those 12 to 15 years (7.9% vs. 5.1%, respectively). Centre location (urban vs. rural) was not significantly associated with IDU or sex with someone of the same gender (p>0.05), but subjects aged 16 to 19 years in urban centres were more likely to report sex for trade than those in rural centres (8.1% vs. 0%; p=0.001). Finally, Native youth were more than twice as likely to report IDU as non-Natives (7.8% vs. 3.5%; p=0.01; results not shown).

Logistic regression identified determinants of high-risk behaviour for young offenders in both age groups (Tables II and III). Significant heterogeneity was observed among the odds ratios (ORs) within each age group; results from regression analyses are therefore presented separately for 12 to 15 and 16 to 19 year olds. Native status was associated with a 5.2-times increased risk of IDU for younger but not for older youth (OR=1.08, p=0.87). Females 16 to 19 years old were 5.3 times more likely than males aged 16 to 19 years to have engaged in IDU, but there was no corresponding association with gender for 12 to 15 year olds (OR=1.38, p=0.59). Among both age groups, significant associations emerged between IDU and sex for trade and female gender (p<0.001). The magnitude of these associations was much larger for 16 to 19 year olds.

TABLE III
Results of Univariate Logistic Regression Analysis of a Sample of Young Offenders Aged 16 to 19 Years Participating in a Voluntary Study of HIV Prevalence and Risk Behaviours in British Columbia, Canada

Variable	Coefficient	OR	95% CI	p-value
IDU				
Gender (female vs. male)	1.66	5.28	(2.12, 13.12)	p<0.001
Ethnicity (Native vs. non-Native)	0.08	1.08	(0.41,2.86)	p=0.87
Sex for Trade				
Gender (female vs. male)	2.25	9.56	(4.63, 19.78)	p<0.001
IDU	2.87	17.64	(6.84,45.48)	p<0.001
Sex with IDU				
Gender (female vs. male)	2.16	8.71	(4.12, 18.44)	p<0.001
IDU	3.49	33.00	(12.27,88.65)	p<0.001

TABLE IV
Results of Multiple Logistic Regression Analysis in a Sample of Young Offenders Aged 12 to 15 Years Participating in a Voluntary Study of HIV Prevalence and Risk Behaviours in British Columbia, Canada

Models	Coefficient	Adjusted Odds Ratio	95% CI	p-value
IDU				
Ethnicity (Native vs. non-Native)	1.65	5.22	(1.80,15.13)	p<0.001
Sex for Trade				
Gender (female vs. male)	1.54	4.64	(1.70, 12.67)	p=0.003
IDU	1.74	5.69	(1.35,23.92)	p=0.018
Sex with IDU				
Gender (female vs. male)	1.08	2.96	(1.09, 7.99)	p=0.033
IDU	2.45	11.60	(3.38,39.77)	p<0.001

TABLE V
Results of Multiple Logistic Regression Analysis of a Sample of Young Offenders Aged 16 to 19 Years Participating in a Voluntary Study of HIV Prevalence and Risk Behaviours in British Columbia, Canada

Models	Coefficient	Adjusted Odds Ratio	95% CI	p-value
IDU				
Gender (female vs. male)	1.66	5.28	(2.12, 13.12)	p<0.001
Sex for Trade				
Gender (female vs. male)	2.07	7.93	(3.57,17.59)	p<0.001
IDU	2.56	13.16	(4.58,37.61)	p<0.001
Sex with IDU				
Gender (female vs. male)	1.98	7.25	(3.08, 17.08)	p<0.001
IDU	3.30	27.09	(9.20,79.83)	p<0.001

In multivariate models, the tendency for the magnitude of the adjusted ORs to differ by age persisted (Tables IV and V). When treated as an independent variable, IDU remained highly predictive of sex for trade and sex with another injection drug user, even after controlling for gender. For both age groups, gender and IDU remained jointly predictive of sex with an injection drug user. No significant two-way interactions were observed.

DISCUSSION

Few estimates of HIV prevalence among incarcerated adolescents in Canada are available. Studies conducted in adult provincial jails in British Columbia and Ontario reported HIV prevalence rates of 0.5% and 0% respectively among those inmates under 20 years of age,[7,10] whereas the present study reported a prevalence rate of 0.25%. Another study of adolescents referred from custodial facilities in Montreal also reported a low HIV prevalence rate of 0.06%.[11] Variation between studies may occur due to differences in study design, small numbers and because youth incarcerated in adult provincial jails are likely to differ from those detained in juvenile detention centres with respect to a number of important behavioural characteristics.

Despite low HIV prevalence, our study revealed that patterns of risk behaviour such as IDU, sex for trade and sex with injection drug users are already established among incarcerated youth. It is of particular concern that IDU was equally prevalent among younger youth aged 12 to 15 compared to 16 to 19 year olds. The proportion of respondents who reported IDU in our study is very similar to a study of adolescents referred from custodial facilities in Montreal,[11] a subsample of male young offenders in Ontario,[10] and a U.S. study of youth in detention.[12]

In some cases, we observed determinants of risk to differ for younger vs. older youth. Female gender was significantly associated with IDU among 16 to 19 year olds, but not among 12 to 15 year olds. Several studies of adult prison populations have reported higher HIV prevalence rates among incarcerated women, which is primarily attributable to IDU and unprotected sex with injection drug users.[7,10,13] Regardless of age, we found females were more likely than males to have traded sex for money or drugs and to report having had sex with an injection drug user. The prevalence of these behaviours increased significantly with older age, which suggests interventions should be aimed at younger female adolescents while there is a greater potential for change.

Our finding that Native young offenders aged 12 to 15 years were five times more likely to have engaged in IDU compared to non-Native youth is cause for concern. Several reports have indicated higher rates of IDU among Canadian Aboriginals than among non-Aboriginals.[14-16] Increasingly, there is evidence of a burgeoning HIV epidemic among Aboriginals, especially in British Columbia.[16,17] In the U.S., studies have shown that ethnic minority youth have higher HIV prevalence rates,[18,19]

lower condom usage[12] and greater misconceptions about HIV/AIDS.[20] These observations suggest that prevention strategies geared towards high-risk youth should take into account ethnocultural differences which may impact upon levels of risk. However, our results should be interpreted cautiously because Native youth were overrepresented in our sample, and our findings may not be generalizable. Since we observed no association between Native status and IDU among older youth, there is a clear need to study factors associated with initiation of injection drug use among older and younger adolescents.

Our study was limited by the fact that we could not collect detailed information on sexual activities, history of sexually transmitted diseases, and drug-using behaviours on this large sample. Further, it is likely that this study underestimated homosexual activity, since only 1% of males reported having sex with another male. Youth may be less likely to report behaviours which are perceived to be stigmatizing in the correctional setting, and this should be taken into account in future research. While we did not specifically address knowledge and awareness of HIV/AIDS among incarcerated youth, it was noted that two respondents, both Native females, claimed to be HIV-positive but actually tested HIV-negative. Similar inconsistencies arose in a B.C. study of adult inmates.[7] Conversely, both youth who tested HIV-positive in our study were unaware of their serostatus. These data suggest that self-reported HIV-positive serostatus should be interpreted with caution in studies of prison populations. Our findings support the need for enhanced HIV/AIDS education in the prison setting and the availability of HIV testing with confidential pre- and post-test counselling.[4,21]

Since we observed IDU to be a strong predictor of other high-risk behaviours such as trading sex for money or drugs and sex with injection drug users, our findings suggest that public health interventions which are geared towards preventing IDU among high-risk youth may impact upon the frequency of other risky behaviours. We obtained a compliance rate of 98% using HIV testing on saliva and a short intake survey, which suggests that detention centres may provide a window of opportunity for monitoring adolescent populations at high risk of HIV infection. Although HIV prevalence was low, our study should not be used to promote a complacence. The dynamic nature of the HIV epidemic among individuals who engage in multiple risk behaviours necessitates ongoing sentinel surveillance among this population.

ACKNOWLEDGEMENTS

The authors are indebted to the Corrections Branch of the Ministry of the Attorney General of British Columbia, the nurses in the youth detention centres who collected the data and saliva specimens, Keven Matthews for assistance with study design, Dr. Martin Schechter for statistical analysis and critique of the manuscript, Dr. Robert Remis for translation of the abstract, Liz Ferris and Rita Dewletian for secretarial support. Technical and financial support for this project was generously provided by the Bureau of Communicable Disease Epidemiology, LCDC, Health Canada, Dr. Don Sutherland, Chief, Division of HIV/AIDS Epidemiology. Financial assistance was also received from the Medical Services Branch, Pacific Region, Health Canada. Dr. Strathdee is supported by a post-doctoral fellow award granted by the National Health Research Development Program, Health Canada.

REFERENCES

1. Rotheram-Borus MJ, Koopman C. Sexual risk behaviors, AIDS knowledge, and beliefs about AIDS among runaways. *Am J Public Health* 1991;81:206-8.
2. DiClemente RJ, Lanier MM, Horan PF, et al. Knowledge, attitudes and behavior among incarcerated adolescents and a public school sample in San Francisco. *Am J Public Health* 1991;81:628-30.
3. Shafer MA, Hilton JF, Ekstrand M, et al. Relationship between drug use and sexual behaviors and the occurrence of sexually transmitted diseases among high-risk male youth. *Sex Transm Dis* 1993;20:307-13.
4. Centers for Disease Control and Prevention. HIV/AIDS education and prevention programs for adults in prisons and jails and juveniles in confinement facilities - United States, 1994. *MMWR* 1996;45(13).
5. Gillmore MR, Morrison DM, Lowery C, et al. Beliefs about condoms and their association with intentions to use condoms among youths in detention. *J Adolesc Health* 1994;15:228-37.
6. Rolf J, Nanda J, Baldwin J, et al. Substance misuse and HIV/AIDS risks among delinquents: A prevention challenge. *Int J Addict* 1991;25:533-59.
7. Rothon DA, Mathias RG, Schechter MT. Prevalence of HIV infection in provincial prisons in British Columbia. *Can Med Assoc J* 1994;151:782-87.
8. Major C, Read S, Coates R, et al. Comparisons of saliva and blood for human immunodeficiency virus prevalence testing. *J Infect Dis* 1991;163:699-702.
9. Schlesselman JJ. *Case Control Studies: Design, Conduct, Analysis*. New York: Oxford University Press, 1982.
10. Calzavara LM, Major C, Myers T, et al. The prevalence of HIV-1 infection among inmates in Ontario, Canada. *Can J Public Health* 1995;86:335-39.
11. Frappier JY, Roy E, Girard M, et al. HIV seroprevalence and risk behaviours study among adolescents with maladaptive and social problems in Montreal. National Health Research and Development Program, Canada, 1995.
12. DiClemente RJ. Predictors of HIV-preventive sexual behavior in a high-risk adolescent population: The influence of perceived peer norms and sexual communication on incarcerated adolescents' consistent use of condoms. *J Adolesc Health* 1991;12:385-90.
13. Hankins C, Gendron S. HIV-1 infection in a medium security prison for women - Quebec. *CDWR* 1989;15-33:168-70.
14. Health and Welfare Canada. Joint National Committee on Aboriginal AIDS Education and Prevention: Findings Document. Ottawa: Health Services and Promotion Branch, Health and Welfare Canada, 1990.
15. Rekart ML, Chan S, Barnett J, et al. HIV and North American Aboriginal peoples. Abstract, VII International Conference on AIDS, Florence, 1991.
16. Calzavara L. In: Surveillance update: AIDS in Canada, Quarterly Report, April, 1994, pp. 28-33. HIV/AIDS Division, Laboratory Centre for Disease Control, Health Canada, Ottawa, Ontario.
17. Patrick DM. HIV infection among aboriginal peoples in British Columbia: Injection drug use, sexually transmitted disease and enhanced surveillance. Abstract, 9th Annual British Columbia HIV/AIDS Conference, Vancouver, 1995.
18. Allen DM, Lehman JS, Green T, et al. HIV infection among homeless adults and runaway youth, United States, 1989-1992. *AIDS* 1994;8:1593-98.
19. St. Louis ME, Conway GA, Hayman CR, et al. Human immunodeficiency virus infection in disadvantaged adolescents: Finding from the U.S. Job Corps. *JAMA* 1991;266:2387-91.
20. DiClemente RJ, Boyer CB, Morales ES. Minorities and AIDS: Knowledge, attitudes and misconceptions among black and Latino adolescents. *Am J Public Health* 1988;78:55-57.
21. Jurgens R. *HIV/AIDS in Prisons: The Expert Committee on AIDS and Prisons.* Montreal: McGill University Press, 1993.

Received: June 11, 1996
Accepted: September 20, 1996